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April 5, 1988

Mr. G. D. Schurtz
B.P. Minerals America
1515 Mineral Square
Salt Lake City, Utah 84112

FILE COPY

RE: Barneys Canyon Project
Notice of Intent Comments

Dear Mr. Schurtz:

We have reviewed the Notice of Intent document for the Barneys Canyon project received on 11 February 1988. A major concern is that during the field inspection it was apparent that the pads and ponds are designed to overlies deposits that consist in large part of sand and gravel. In the event of an accident or other unforeseen problems, toxic cyanide solutions would rapidly seep to the groundwater. This is a problem that must be solved. Please keep this problem in mind as you read the following comments, many of which are related to this situation.

1. Page 6. The process pond containment system must be designed to contain the 100 year, 24 hour storm event, the design snow melt, a complete leach pad system drain down in addition to the normal operating liquid inventory. This is required because the facility will not be in operation more than 9 months of the year as indicated in the project design criteria on page 45.
2. Pages 9-12. We appreciate the information which was included in the Notice of Intent document concerning siting feasibility. It has added to our understanding of the proposed project. However, we continue to request information concerning the economics involved in the selection of these various sites. It is suggested that a percentage comparison between the sites, evaluated with the selected site used as a base, may give us some perspective. Also it would be helpful to our evaluation if some rough numbers could be compiled considering locating the leach site in Dry Fork Canyon as requested in our 23 December 1987 letter, due to this site having less potential impact on the groundwater quality of the valley.
3. Page 16. We request that the proposed facility layout be superimposed on the pre-disturbance site map so we can evaluate the exploration work which has been done with regard to the various components of the facility.

4. Page 17. If the tuff derived clay layer is to be considered a confining bed or aquitard for this project, its integrity or extent of fractures must be established. Once the nature of the aquitard is established it must be determined if it provides adequate protection to the underlying groundwater.
5. Page 20. We have serious concern about the suitability of the site with the groundwater table being approximately 120 feet beneath the ground surface. This concern is magnified because this groundwater recharges aquifers which supply drinking water to Copperton and other communities in the Salt Lake Valley. More extensive investigation under each proposed pad site and the proposed process pond sites must be conducted. We wish to revisit the site when some test pits may be inspected.
6. Page 24. If it is to be inferred that clay is the basic material of the soil, then sufficient soil testing under all proposed pad and process pond sites must be conducted to establish this fact.
7. Page 24. The extent of the perched water table must be defined and the potential for the project to impact the quality of the perched water table must be evaluated.
8. Page 27. The section on local recharge characteristics should be reevaluated based on actual test information from the areas, where the proposed leach pads and process pond will be located.
9. Page 28. The alluvial deposits observed during our field inspection contained large amounts of gravel material. We request that testing procedures and assumptions required to conduct permeability tests with such a large gravel fraction be presented.
10. Page 28. The location of the Packer tests in table 4.2-2 must be shown with relation to the proposed leach pads and process ponds.
11. Page 28. We request that the possibilities for lateral flow in the soil profiles beneath the pads and ponds be evaluated and commented on.
12. Page 29. The mechanism for recharge of the ground water aquifer in the vicinity of the proposed leach pads and process ponds must be established. This will help us establish the potential for impacting the ground water due to the proposed heap leach pads and process ponds.
13. Page 30. The location, sampling depth and logic for location of existing and proposed monitoring wells must be submitted for review. Also the location of these monitoring wells on the detailed project plans must be provided.

14. Page 30. We again emphasize that we have very serious concerns about the close proximity of groundwater to the proposed heap leach pads and process ponds without a demonstrated impervious natural barrier. If this barrier cannot be established by exploration, more stringent design considerations and operational conditions must be imposed to protect the ground water resource, or else another site or different leaching solution chosen.
15. Page 30. We have serious concerns because the subsurface profile consists of interbedded sands, gravels and clay layers overlying a volcanic rock, which is the main aquifer material. If this is the case, the only way that the project will be allowed to proceed will be that a substantial liner system underlain by a leak detection system be proposed. It must also be understood that an operational condition will be that a compromise of the liner system will require immediate cessation of operations and closure if the leak can not be repaired or isolated.
16. Page 30. We request more detailed information concerning the T and K for the hardrock aquifer beneath the site for which BP Minerals gives the bedrock groundwater flow velocity of 0.01 to 0.12 feet per year. We would like a table giving the number of tests and the calculated T and K.
17. Page 33. We request that the Copperton water supply wells located down gradient from the proposed site be sampled, commencing immediately and on a monthly basis through the life of the project for total and free cyanide concentrations.
18. We request BP Minerals test other possible leaching solutions for compatibility with the ore, particularly those that are much less toxic, such as thiourea.
19. Page 39. The chemical stability of the constituents of the waste rock when exposed to the environment must be established. A worst case estimate of the characteristics of the water which will seep from the waste rock pile must be developed and submitted for review. If any sulfide materials will be processed, the manner in which they will be leached and disposed of must be discussed.
20. Page 42. The leach solution system (process ponds) must be sized to contain the 100 year 24 hour storm event from the leach pads and precipitation falling directly upon the ponds, a complete drain down of the heap leach facilities, the operating liquid inventory, and the design snow melt. This is because the facility is proposed to be operated approximately nine (9) months per year. In addition the detailed plans and specifications must contain an operational plan for draining the system for winter closure so the facilities will not be damaged by freezing.

21. Page 42. It must be determined for the Barneys Canyon pit and the Mel-Co pit if it is anticipated that mine water will be encountered. If it is possible that mine water will be present, a proposal must be provided for containment and/or treatment and discharge of these mine waters. Unless the water is of good chemical quality it cannot be discharged.
22. Page 44. The design criteria for sizing the hydraulic capacity of the process ponds must be the operating liquid inventory, the complete heap leach pad liquid inventory, the 100 year 24 hour storm event and the design snow melt.
23. Page 45. We request more detailed information about the sequential construction of pad #1 and particularly about the construction interface which will be proposed between one year's construction of the pad and the next.
24. Page 48. The maximum allowable permeability of the secondary clay liner material must be 1.0×10^{-7} cm/sec.
25. Page 52. We have concerns whether the variable permeability layers above the flexible membrane material can be constructed as you proposed due to the sensitivity of hydraulic conductivity to a very small fraction of clay material. Before this concept can be accepted as a viable portion of this design its ability to be constructed and perform as indicated must be established.
26. Page 54. As previously mentioned, if the facilities are proposed to operate only 9 months of the year then the process ponds must be designed to contain a complete drain down of the heap leach pads in addition to the other design criteria previously specified.
27. Page 55. In addition the process ponds must be designed to contain the design snow melt.
28. Page 56. Additional information must be provided on the six (6) inches of sand which will be placed between the secondary clay liner and the flexible membrane liner. Information about its hydraulic conductivity and the disposition of leakage which may flow into the sand must be provided. Our proposed liner system does not require the 6 inch bed of sand.
29. Page 56. An operational requirement for the process ponds must be that if leakage is detected the pond must be drained immediately and the leak repaired before the pond can be put back into operation.
30. Page 56. The proposal that process solution volumes in excess of the design volumes be allowed to flow into adjacent drainages to sedimentation basins as an extra margin of safety, is unacceptable. It is perceived that water which will flow in these drainages will quickly enter the ground water system.

31. Page 58. An operational proposal must be developed during the plan and specification review process for reducing the working inventory to the leaching solutions in accordance with the amounts specified in the design criteria for the winter shut down.
32. Page 62. Additional information about the nature and constituents of the chemical waste sump must be provided for review. Also, the disposition of materials from this sump must be provided for review.
33. Page 63. The constituents in the wastewater from the truck wash and lube area which are proposed to be disposed of in the truck shop septic system must be provided for review.
34. Page 63. The position of the Bureau of Water Pollution Control has been that if the total domestic wastewater flow from a proposed project exceeds 5000 gallons per day, the domestic wastewater system must be approved by the Bureau even if the flow is divided over several independent septic systems, throughout the project.
35. Page 64. The proposed procedures which will be used to seal the existing culvert, which allows surface drainage to flow beneath the railroad grade, must be submitted for review. Details of the criteria which will initiate the periodic removal of sediments from the sediment collection basins must be submitted for review during the plan and specification review process.
36. Page 68. It appears as though there will be significant concerns about sediment control as a result of the Mel-Co pit.
37. Page 69. We re-emphasize our previously stated position that the release of minimal amounts of leaching solutions into the environment is unacceptable in Utah. This position for the B. P. Minerals project is critical due to the established presence of good quality groundwater below the project and it's usage as a domestic water supply in close proximity to the project.
38. Page 69. The basic liner system requirements for heap leach pads in Utah have been transmitted in a separate letter.
39. Page 69. We request that the stresses which will be imposed upon the flexible membrane liner by pushing the dumped material out over the liner be evaluated.
40. Page 69. The effectiveness of the ore and piping in the process solution collection system for reducing the hydraulic head on the flexible membrane to twelve (12) inches or less must be established.
41. Page 70. During the plan and specification review an operational plan must be developed and submitted for review which will address all aspects of operational interfacing resulting from segmented construction of heap leach pads.

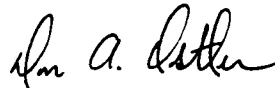
42. Page 71. The statement that "minute amounts of solution would be essentially soaked up in the clay secondary liner where it would be immobilized permanently" must have supporting documentation. Results of materials analyses, attenuation studies, and documentation of the nature and continuity of the subsurface soil beneath the heap leach pads and process ponds must be provided to evaluate this conclusion. The available literature does not offer a lot of support for this conclusion.
43. Page 71. The process pond leak detection system must include a collection piping system. Also, if leakage is detected the process ponds must be drained immediately and the leak repaired before the process pond is put back into operation.
44. Page 72. The ability of the soils which exist beneath the heap leach pads and process ponds to attenuate cyanide must be established and submitted for review. The literature states that montmorillinite soils do not attenuate much cyanide.
45. Page 72. The ability of the soils and the temperature beneath the heap leach pads and the process ponds to buffer the pH and attenuate and volatilize cyanide must be established.
46. Page 73. The leak detection system for the heap leach pad must be monitored daily throughout its life. The leak detection system for the process pond must be monitored daily during the first three months of operation and weekly throughout the remainder of its life.
47. Page 74. Pipelines may be repaired as soon as possible as long as they are contained and any leakage will flow into the process ponds, heap leach pads or other acceptable containment.
48. Page 74. The criteria for establishing a legally reportable quantity of cyanide should be defined.
49. Page 74. The neutralization criteria for the heap leach pad once the leaching operations have been completed, must be established. Currently the minimum neutralization criteria in Utah are as follows:
 - a. pH of 6.5 to 7.5
 - b. Weak acid dissociable (WAD) cyanides less than or equal to 0.20 mg/l.
 - c. Total cyanide less than or equal to 0.75 mg/l.
 - d. Metals content shall meet drinking water standards or surface water quality standards which ever is more stringent

50. Page 74. The neutralized and drained heap leach pads must be fenced and capped with nine (9) inches of clay material which will prevent the penetration of precipitation into the spent ore. This will promote the runoff of precipitation from the surface of the spent ore pile. Alternatives to providing this clay cap would be to modify the heap leach pad so no discharge would occur, or to treat the spent ore so there would be no concerns about the quality of any water discharged.
51. Page 74. Before the pond liners can be folded for disposal it must be established by testing that the cyanide has been neutralized and that all other constituents of the process fluids and/or slimes have been treated or removed so there will not be any adverse impacts on groundwater quality.
52. Appendix C 3.2.2 The flexible membrane liner material must meet the minimum requirements of the National Sanitation Foundation (NSF) standard No. 54 and must be installed utilizing the shingle effect as much as possible.
53. Appendix C 4.1. The field seam testing procedure is critical to the success of the flexible membrane liner. The destructive and non-destructive test methods must be specified.
54. Appendix D 3.1.1. The testing frequency to verify the integrity of the secondary clay liner with regard to in-place densities, thickness and permeability must be established for each lift.
55. Appendix D 3.3 The percentage of field seam footage to be tested by non-destructive and destructive testing must be specified.
56. More detailed information must be provided to establish the stability of the proposed liner system constructed on a 9 percent slope.

This concludes our comments on this document. Please call Mack Croft or Charlie Dietz of my staff if there are any questions.

Sincerely,

UTAH WATER POLLUTION CONTROL COMMITTEE



Don A. Ostler, P.E.
Executive Secretary

CC: Mr. Greg Boyce, Utah Copper
Mr. Kent Miner, Salt Lake City-County Health Dept.
Mr. Brian Buck, JBR Consultants

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